Remarks

This amendment responds to the Office action dated June 13, 2006. By this amendment, applicants are amending several of the pending claims, canceling claim 4, and adding new claims 64-70. With entry of this amendment, claims 1-3 and 5-70 will be pending in the application. Reconsideration of the application is requested in view of the above amendments and the following remarks.

The § 112 Rejections Should Be Withdrawn

In the Office action, the Examiner rejects several of the pending claims under 35 U.S.C. § 112, second paragraph. (Office action at pg. 3.) The Examiner's rejections are all traversed. Each rejection is discussed in turn below.

The Examiner rejects claim 3 for reciting "a heavily doped substrate" and claims 4, 15, 26, and 27 for reciting "a lightly doped substrate." Although Applicants disagree, Applicants have amended the claims to more broadly recite "a doped substrate" and canceled claim 4. Accordingly, the Examiner's § 112 rejections of claims 3, 15, 26, and 27 should be withdrawn. *See also* MPEP 2173.05(b).

The Examiner rejects claims 14, 16, 19, 22, 25, 44, and 56, apparently for reciting alternative elements. Applicants first note that claim 44 does not recite the objected-to language, and it is believed that the Examiner meant to recite claim 48. Further, MPEP 2173.05(h)(I) explains that "[a]lternative expressions are permitted if they present no uncertainty or ambiguity with respect to the question of scope or clarity of the claims." In the interest of expediting prosecution, applicants have also amended claims 14, 16, 19, 22, 25, 48, and 56 to further explain certain features recited therein. Because the amended claims are not uncertain or ambiguous in scope or clarity, the Examiner's § 112 rejections of the respective claims should be withdrawn.

The Examiner rejects claims 39 and 55 for reciting units of "μm" instead of "μm^2." Applicants have amended claims 39 and 55 to address the Examiner's concerns.

The Examiner rejects claim 46 for reciting the term "substantially." Applicants disagree but, in the interest of expediting prosecution, have amended the claim to address the Examiner's

concern. The Examiner also rejects claim 46 for containing a minor typo. Applicants have amended claim 46 to correct this informality.

The Examiner rejects claims 1, 11, 29, 32, 35, 38, 44, 53, and 61 for using the phrase "associated with." Applicants submit that one of ordinary skill in the art would understand the phrase as it is used in the respective claims in view of the Specification. For example, the Specification of the present application explains:

> [C]ertain embodiments of the disclosed methods use scalable Z parameters that relate a voltage applied to a first contact and an associated current at a second contact. In general, for an arbitrary pair of contacts j and m, an associated Z parameter, denoted as "Z_{jm}," is a ratio of an open-circuit voltage at the contact j to the source current at the contact m. In other words, the Z parameter relating contacts j and m is the open-circuit voltage at contact j (V_j) divided by a source current at contact m (I_m), or,
>
> $$Z_{jm} = \frac{V_j}{I_m}$$
>
> . . . . A contact j also has a parameter Z_{jj} associated with a groundplane. The parameter Z_{jj} can be defined as a ratio of open-circuit voltage at the contact j to a current at the contact j, with all other contacts considered as open circuits.

(Specification at pg. 17, line 20 to pg. 18, line 6) (Emphasis added.)

Because those skilled in the art would understand what is claimed in claims 1, 11, 29, 32, 35, 38, 44, 53, and 61, when the respective claims are read in light of the specification, the Examiner's rejection should be withdrawn. *See* MPEP 2173.02 ("The test for definiteness under 35 U.S.C. 112, second paragraph, is whether 'those skilled in the art would understand what is claimed when the claim is read in light of the specification.'") (citations omitted).

The Examiner rejects claim 47 for reciting the term "about." Applicants disagree with the rejection but, in the interest of expediting prosecution, have amended the claim to address the Examiner's concern.

The Examiner rejects claim 54 for reciting the term "substantially." Applicants disagree with the rejection but, in the interest of expediting prosecution, have amended the claim to address the Examiner's concern.

For at least these reasons, all of the Examiner's § 112 rejections should be withdrawn and such action is respectfully requested.

The § 101 Rejections Should Be Withdrawn

The Examiner rejects claims 1-63 under 35 U.S.C. § 101. (Office action at pgs. 2-3.) In particular, the Examiner contends that the claim language of independent claims 1, 29, 35, 38, 44, 53, and 61 does not claim a practical application with a tangible result. (Office action at pg. 2.)

Applicants traverse the rejection but, in the interest of expediting prosecution, have amended each of independent claims 1, 29, 35, 38, 44, 53, and 61. These amendments are supported by the nonprovisional application as filed at, for example, pg. 16, line 18 through pg. 17, line 2 ("[S]ome of the methods described herein can be implemented in software, stored on a computer-readable medium, and executed on a computer. Some of the disclosed methods, for example, can be implemented in an electronic-design-automation ("EDA") tool, such as a design and verification tool"); pg. 19, lines 3-6 ("The resulting resistances are indicative of substrate noise coupling and can be evaluated by a . . . design tool to determine whether any modifications should be made to the design."); pg. 17, lines 5-10 ("As can be seen in FIG. 1, the overall substrate-coupling-resistance network is a complex one"); pg. 35, line 20, through pg. 36, line 2 ("By contrast, the disclosed Z-parameter models can be used directly to generate a compact network representation in an efficient manner").

The amendments are also supported by U.S. Provisional Application No. 60/417,518, which is incorporated by reference, at, for example, pg. 1 ("The silicon substrate is modeled as a complex resistive network that models the coupling between various sections of a chip for low frequency applications. This resistive network is used in SPICE simulations to predict the noise coupling") and in the various appendices reciting computer source code for retrieving stored parameters, processing stored parameters, and storing the results from the processing. *See also* MPEP 2163.I.B (stating that there is no *in haec verba* requirement for the written description requirement of 35 U.S.C. § 112, para. 1, and that claim limitations can be supported through "express, implicit, or inherent" disclosure).

As amended, each of the respective independent claims is believed to recite statutory subject matter—namely, processes providing a practical application that produce a useful, concrete, and tangible result. For at least these reasons, the Examiner's 35 U.S.C. § 101 rejection should be withdrawn and such action is respectfully requested.

The 35 U.S.C. § 102(b) Rejection of Claim 1 Should Be Withdrawn

The Examiner rejects claim 1 as being anticipated under 35 U.S.C. § 102(b) by Chou et al., "Multilevel Integral Equation Methods for the Extraction of Substrate Coupling Parameters in Mixed-Signal IC's," *IEEE Design Automation Conference*, pp. 20-25 (1998) ("*Chou*"). (Office action at pgs. 3-4.) In particular, the Examiner suggests that the introduction section of *Chou* teaches the elements of claim 1. (Office action at pgs. 3-4.) The Examiner's rejection is traversed.

Amended independent claim 1 recites a method of substrate modeling, comprising:

> determining scalable *Z* parameters associated with at least two substrate contacts;
>
> constructing a matrix of the scalable *Z* parameters for the at least two substrate contacts;
>
> calculating an inverse of the matrix to determine resistance values associated with the at least two substrate contacts; and
>
> storing the resistance values as part of a representation of a substrate-coupling resistance network.

The introduction section of *Chou* reviews several techniques for modeling the parasitic noise coupling through the common substrate of a single chip mixed-signal system. The techniques mentioned include: (1) techniques based on solving Laplace's equation inside the substrate with proper boundary and interface conditions; (2) integral equation based techniques, including heuristic partitioning schemes "to sparsify the matrix inverse by setting direct admittances to contacts outside a user-defined region to zero"; (3) iterative schemes; and (4) multigrid or multilevel methods.

None of the descriptions in the introduction section of *Chou*, however, teaches or suggests determining "scalable" parameters. More particularly, the introduction section of *Chou* does not teach or suggest "determining scalable *Z* parameters associated with at least two substrate contacts" as in amended independent claim 1.

Accordingly, the cited section of *Chou* does not teach every element of amended independent claim 1. The Examiner's 35 U.S.C. § 102(b) rejection of claim 1 should therefore be withdrawn, and such action is respectfully requested. *See* MPEP 2131 ("To anticipate a claim, the reference must teach every element of the claim.")

The 35 U.S.C. § 102(b) Rejection of Claim 29 Should Be Withdrawn

The Examiner rejects claim 29 as being anticipated under 35 U.S.C. § 102(b) by the *Chou* paper. (Office action at pgs. 3-4.) In particular, the Examiner suggests that the introduction section of *Chou* teaches the elements of claim 29. (Office action at pgs. 3-4.) The Examiner's rejection is traversed.

Amended independent claim 29 recites a method of substrate modeling, comprising:

> determining scalable parameters associated with at least two substrate contacts, at least one of the scalable parameters being scalable with a contact perimeter;
>
> constructing a matrix of the scalable parameters for the at least two substrate contacts;
>
> calculating an inverse of the matrix to determine resistance values associated with the at least two substrate contacts; and
>
> storing the resistance values as part of a representation of a substrate-coupling resistance network.

Again, the introduction section of *Chou* reviews several techniques for modeling the parasitic noise coupling through the common substrate of a single chip mixed-signal system. The techniques mentioned include: (1) techniques based on solving Laplace's equation inside the substrate with proper boundary and interface conditions; (2) integral equation based techniques, including heuristic partitioning schemes "to sparsify the matrix inverse by setting direct admittances to contacts outside a user-defined region to zero"; (3) iterative schemes; and (4) multigrid or multilevel methods.

None of the descriptions in the introduction section of *Chou*, however, teaches or suggests determining "scalable" parameters. More particularly, the introduction section of *Chou* does not teach or suggest "determining scalable parameters associated with at least two substrate contacts, at least one of the scalable parameters being scalable with a contact perimeter" as in amended independent claim 29.

Accordingly, the cited section of *Chou* does not teach every element of amended independent claim 29. The Examiner's 35 U.S.C. § 102(b) rejection of claim 29 should therefore be withdrawn, and such action is respectfully requested. *See* MPEP 2131 ("To anticipate a claim, the reference must teach every element of the claim.")

The 35 U.S.C. § 102(b) Rejection of Claim 35 Should Be Withdrawn

The Examiner rejects claim 35 as being anticipated under 35 U.S.C. § 102(b) by *Chou*. (Office action at pgs. 3-4.) In particular, the Examiner suggests that the introduction section of *Chou* teaches the elements of claim 35. (Office action at pgs. 3-4.) The Examiner's rejection is traversed.

Amended independent claim 35 recites a method of substrate modeling, comprising:

> determining scalable parameters associated with at least three substrate contacts;
>
> constructing a matrix of the scalable parameters representative of the at least three substrate contacts;
>
> calculating resistance values associated with the at least three substrate contacts from the matrix; and
>
> storing the resistance values as part of a representation of a substrate-coupling resistance network.

Again, the introduction section of *Chou* reviews several techniques for modeling the parasitic noise coupling through the common substrate of a single chip mixed-signal system. The techniques mentioned include: (1) techniques based on solving Laplace's equation inside the substrate with proper boundary and interface conditions; (2) integral equation based techniques, including heuristic partitioning schemes "to sparsify the matrix inverse by setting direct admittances to contacts outside a user-defined region to zero"; (3) iterative schemes; and (4) multigrid or multilevel methods. None of the descriptions in the introduction section of *Chou*, however, teaches or suggests determining "scalable" parameters. More particularly, the introduction section of *Chou* does not teach or suggest "determining scalable parameters associated with at least three substrate contacts" as in amended independent claim 35.

Accordingly, the cited section of *Chou* does not teach every element of amended independent claim 35. The Examiner's 35 U.S.C. § 102(b) rejection of claim 35 should therefore be withdrawn, and such action is respectfully requested. *See* MPEP 2131 ("To anticipate a claim, the reference must teach every element of the claim.")

Conclusion

With entry of this amendment, the Application is believed to be in condition for allowance and such action is respectfully requested. If any further issues remain, the Examiner is invited to call the undersigned to discuss such matters.

Respectfully submitted,

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